INTRODUCTION

Recovery Unit Designation

The Northeast Washington Recovery Unit is one of 22 recovery units designated for bull trout in the Columbia River Basin (Figure 1). In Washington, to facilitate the recovery planning process and avoid duplication of effort, the recovery team has adopted the logistical framework proposed in the 1999 draft statewide strategy to recover salmon entitled "Extinction Is Not An Option" (WGSRO 1999). Based on this draft strategy, bull trout recovery units overlap the state's salmon recovery regions. The use of recovery units will allow for better coordination during both salmon and bull trout recovery planning and implementation.

The Northeast Washington Recovery Unit encompasses the mainstem Columbia River and tributaries above Chief Joseph Dam up to the Canadian border (Figure 2). This recovery unit geographically overlaps ceded lands of the Colville, Kalispel, and Spokane tribes. When the Northeast Washington Recovery Unit has achieved its goal, the Washington Department of Fish and Wildlife and the aforementioned tribes will determine the location and level of bull trout harvest which can be sustained while maintaining healthy populations.

The Northeast Washington Recovery Unit includes bull trout above Chief Joseph Dam on the mainstem Columbia River. Major tributaries include the Sanpoil, Spokane, Kettle, Colville and Pend Oreille Rivers. Based on survey data and professional judgement, the Northeast Washington Recovery Unit Team identified one core area (Pend Oreille River) in the recovery unit (Figure 3). For the purposes of recovery, a core area represents the closest approximation of a biologically functioning unit. Core areas consist of both core habitat that could supply all the necessary elements for every lifestage of bull trout (*e.g.*, spawning, rearing, migratory, and adult), and have one or more groups of bull trout. Core areas are the basic units upon which to gauge recovery within a recovery unit.

Figure 1. Bull Trout Recovery Units in the United States.

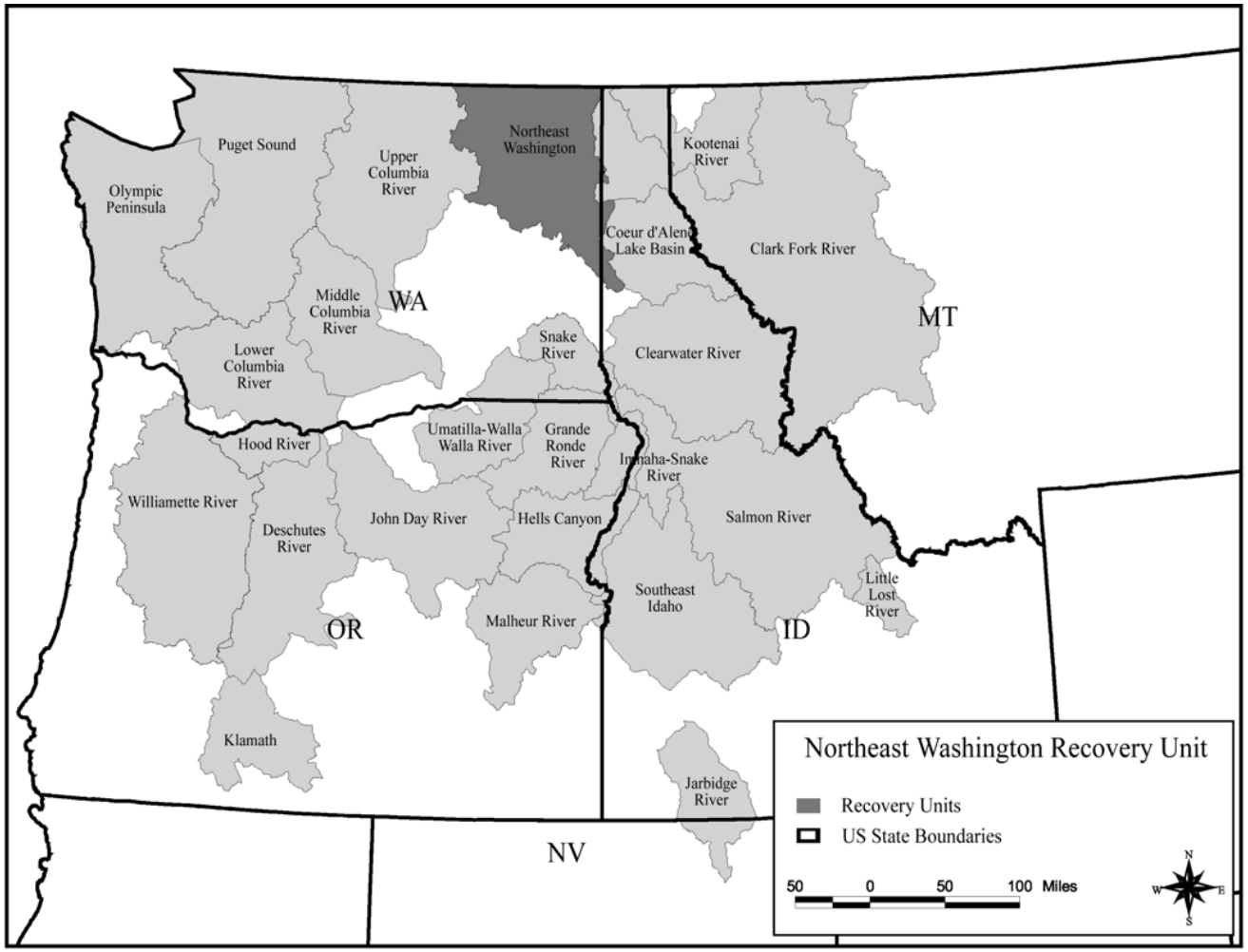


Figure 2. Northeast Washington Recovery Unit.

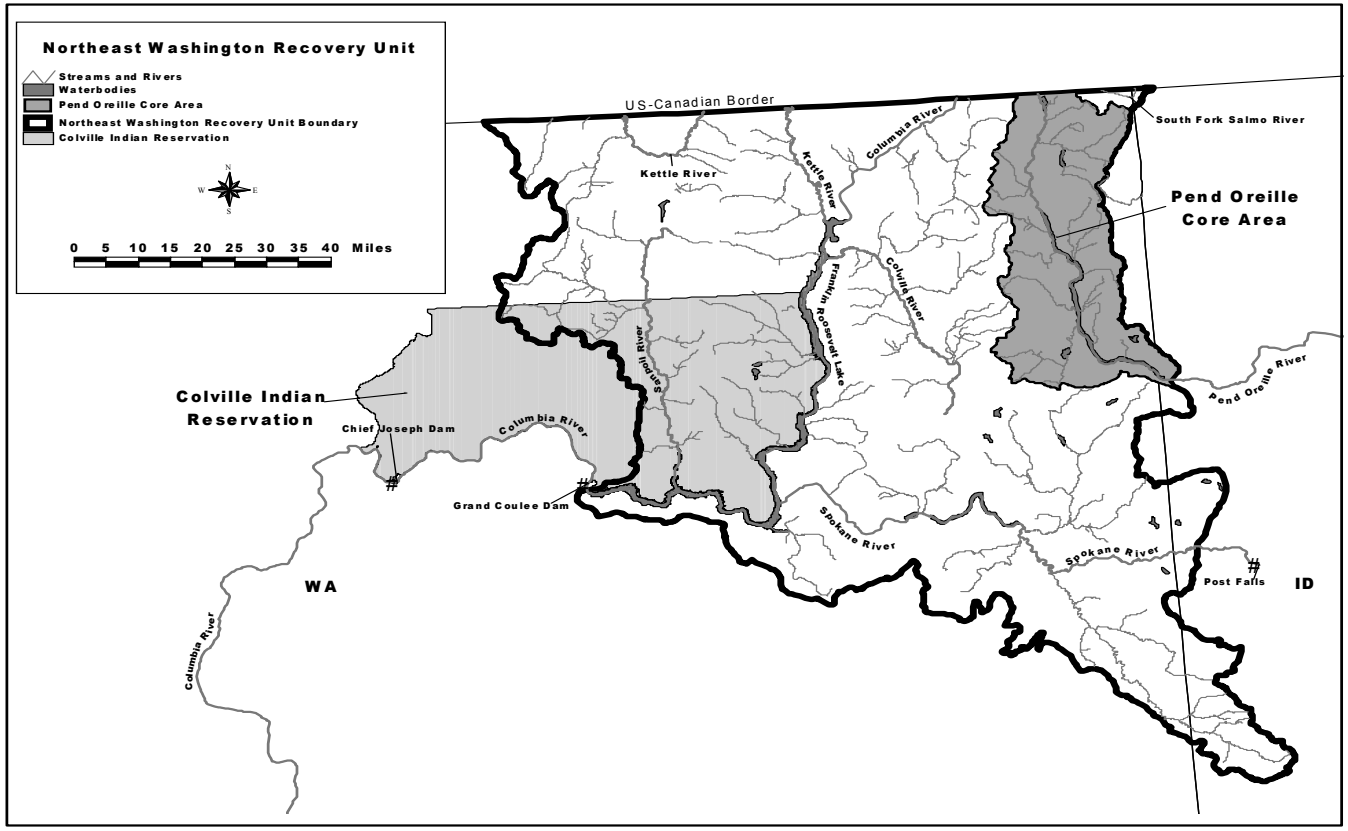
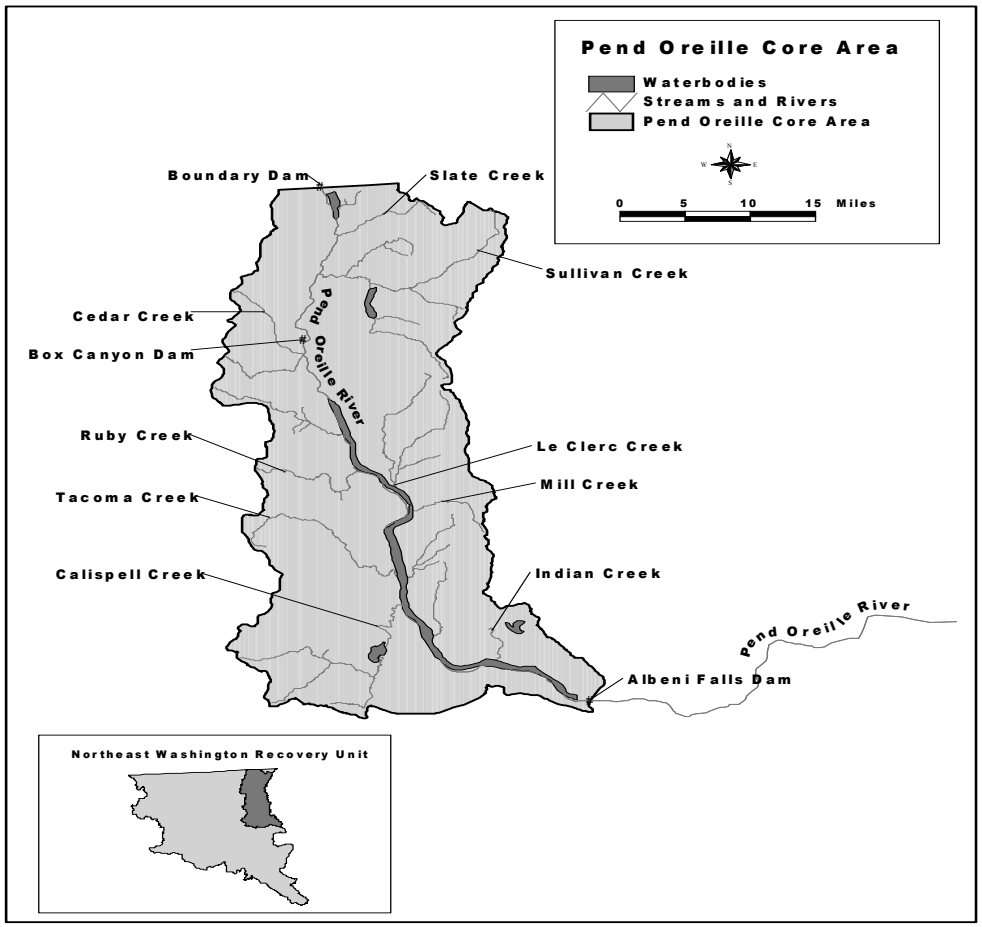


Figure 3. Pend Oreille Core Area and selected tributaries.



While sightings of individual bull trout have occurred within the Pend Oreille Core Area, only one local population (Le Clerc Creek complex) has been identified. A local population is defined as a group of bull trout that spawn within a particular stream or portion of a stream system. A local population is assumed to be the smallest group of fish that is known to represent an interacting reproductive unit. For most waters where specific information is lacking, a local population may be represented by a single headwater tributary or complex of headwater tributaries.

Geographic Description

In general, the Northeast Washington Recovery Unit encompasses a geologically distinct area known as the Okanogan Highlands. The highlands are more similar in terms of climate and vegetation to the Northern Rocky Mountains than to the Cascade Mountains to the west. Dominant geologic features in the area include the Kettle, Selkirk, Calispell, and Huckleberry mountain ranges (USDA 1978, USDA 1981, USDA 1995). In general, these mountain ranges are oriented in a north-south direction with elevations from 1,525 to 2,135 meters (5,000 to 7,000 feet). Major river valleys within the Northeast Washington Recovery Unit include the Spokane, Pend Oreille, Colville, Kettle, San Poil, and Columbia. The Spokane River flows in a general east-west direction and marks the boundary between the Okanogan Highlands to the north and the Spokane Plateau to the south. During the most recent ice age, the Cordilleran Ice Sheet extended south and covered a majority of the Northeast Washington Recovery Unit leaving only the higher peaks remaining exposed. As glaciers retreated, recessional lakes and associated deposition of glacial material was common.

The Pend Oreille River is characterized by recent alluvial sediments in low valley segments with bedrock and granitic rock outcrops dominating the canyon walls. The Pend Oreille River lies between the Selkirk Mountain to the east and the Chewelah Mountains to the west (NPPC 2001). These mountains are not more than 2,072 meters (6,798 feet) above sea level. The southern portion of the subbasin is mostly rural with large areas of forested mountains and valleys of open pasture. The surrounding topography of the northern portion of the subbasin is relatively abrupt, and the mountains are steep and rugged.

The climate of northeastern Washington is influenced by both continental and maritime air masses (NPPC 2001). Most of the weather systems affecting the northeastern portion of the state are controlled by prevailing westerly winds. Air from the Pacific Ocean has a moderating influence throughout the year and summertime temperatures are moderate with light precipitation levels. Due to continental influences, summers are warmer and winters are colder than in coastal areas. Daily temperatures range from -9 to -1 degrees Celsius (15 to 30 degrees

Fahrenheit) in the winter, and 8 to 24 degrees Celsius (46 to 76 degrees Fahrenheit) in the summer. Average annual precipitation at lower elevations is approximately 63.5 centimeters (25 inches), while at higher elevations, the average annual precipitation ranges from 89 to 140 centimeters (35 to 55 inches). The majority of precipitation falls in the winter and spring, with peak accumulations occurring from November through January. Total annual snowfall averages 127 to 152 centimeters (50 to 60 inches) in the Pend Oreille River valley and accounts for approximately 20 percent of the average annual precipitation.

The Pend Oreille River is the second largest river in Washington and flows for 249 kilometers (155 miles) from its headwaters at Lake Pend Oreille to the confluence with the Columbia River in British Columbia (NPPC 2001). Several hydroelectric facilities occur within the system. Albeni Falls Dam is located in Idaho approximately 3.5 kilometers (2 miles) upstream from Newport, Washington. Box Canyon Dam, owned and operated by Pend Oreille County Public Utility District Number 1, is located on the Pend Oreille River and forms a 2,983 hectare (7,371 acre) reservoir. Box Canyon Reservoir extends 89.8 kilometers (56 miles) from Albeni Falls Dam downstream to Box Canyon Dam. Owned and operated by Seattle City Light, Boundary Dam, is located approximately 1.6 kilometers upstream (one mile) from the U.S. - Canadian border. This reservoir is 28.1 kilometers (17.5 miles) long and has a surface area of about 664 hectares (1,641 acres) at full pool. Box Canyon Dam and Albeni Falls Dam are run-of-river projects while Boundary Dam is operated for power peaking generation.

Hydrologic records are maintained by the U.S. Geological Survey and gaging stations on the mainstem Pend Oreille River include: Box Canyon Reservoir near the town of Newport, at the town of Cusick (below Box Canyon Dam), downstream of Box Canyon Dam, and at the international boundary on the mainstem. In addition, there is also a U.S. Geological Survey gage on Calispell Creek.

DISTRIBUTION AND ABUNDANCE

Status of Bull Trout at the Time of Listing

At the time of listing, the U.S. Fish and Wildlife Service identified only one subpopulation (South Fork Salmo River) within the Northeast Washington Recovery Unit (USFWS 1998). The U.S. Fish and Wildlife Service considered bull trout in the lower Pend Oreille River to be at high risk of extirpation. The U.S. Fish and Wildlife Service identified that bull trout in the Nespelem, San Poil, and Kettle Rivers may have been extirpated. Although subpopulations were an appropriate unit upon which to base the 1998 listing decision, the recovery plan has revised the biological terminology to better reflect the current understanding of bull trout life history and conservation biology theory. Habitat and population terminology is found in Appendix 1.

Migratory Life History

Two distinctly different migration patterns for adfluvial bull trout have been documented. The most common migrational pattern is when adult bull trout move upstream from a lake into smaller tributaries to spawn. The second migrational pattern involves adult fish moving downstream from a lake system, and spawning in either a mainstem river, or in a smaller tributary stream. This second, and less common pattern is known to occur in the Lake Wenatchee (Washington) and Bull Lake (Montana) systems (Fredenberg, W. *in litt*. 2001; USFWS 2001). In addition, a similar but less pronounced downstream movement to spawning reaches has been documented in the Cline River, Alberta, and is thought to be occurring in the Chewuck River in Washington. In the Cline River, adult bull trout move downstream out of Pinto Lake and spawn primarily in the first 600 meters (1969 feet) of the outlet portion of the river (Herman 1997). Bull trout redds have also been found downstream of Black Lake in Lake Creek, a tributary to the Chewuck River (Delavergne, J. *in litt*. 2001).

This downstream migration pattern was also believed to have occurred in the Pend Oreille River basin in Idaho and Washington. Adult bull trout would migrate out of Pend Oreille Lake, down the Pend Oreille River and then into tributary streams to spawn, with the progeny eventually returning to the lake.

This is supported by ethnographic reports of large migratory bull trout (up to 25 pounds or approximately 11 kilograms) being harvested annually during the late summer and fall at weir sites near the mouths of many tributaries in Idaho and Washington (Smith, A. *in litt*.1936-38). There is some speculation that historically Albeni Falls was a barrier to fish passage. However, reports from Gilbert and Evermann (1895) state that these falls were scarcely more than pretty steep rapids during their visit in August, with a total decent of probably 3 meters (10 feet), but as a rapid and not as a vertical fall.

This migration pattern however was eliminated with the construction and operation of Albeni Falls Dam (1952), just upstream of the Idaho-Washington state-line. Albeni Falls Dam was constructed without any provision fish passage, and now only an occasional migratory bull trout entrained by the dam make the downstream migration, with no return migration possible. Evidence of this occurring was documented in 1999, when a large bull trout approximately 61 centimeters (24 inches) in length was captured in Indian Creek, a tributary to the lower Pend Oreille River, in the Box Canyon Reservoir reach. This marked fish is believed to have originated from Trestle Creek, a tributary stream to Pend Oreille Lake (Maroney, J. pers. comm. 2000).

Current Distribution and Abundance

Pend Oreille Core Area

Ethnographic data indicates that the Kalispel Tribe had an elaborate technology used for the exploitation of resident fishery resources. These resident fisheries were at least as, if not more, important to the Kalispel Tribe than their anadromous fishery (Bonga, D. *in litt*. 1978, Smith, A. H. *in litt*. 1985). Gilbert and Evermann (1895) reported that in 1894 bull trout were abundant in the Pend Oreille River and specimens as large as 66 centimeters (26 inches) long were in the possession of individual Kalispel Tribe members. The ethnographic data also identifies specific tributaries where individual Kalispel Tribe members would harvest "char". The ethnographic reports indicate that large migratory bull trout were harvested annually during the late summer and fall at weir sites near the mouths of many tributaries in Idaho and Washington (Smith, A. *in litt*.1936-38).

Bull trout and other salmonids still existed in the lower river after Albeni Falls Dam was built (West, K. pers. comm. 1997). These bull trout may have been using spawning and rearing habitat within Pend Oreille River tributaries, including lower Slate, Le Clerc, and Ruby creeks (Cole, R. pers. comm. 1998; Gray, L. pers. comm. 1999). In the early 1950s, during spawning seasons, heavy concentrations of whitefish and Dolly Varden could be found at the mouth of Le Clerc Creek (Cole, R. pers. comm. 1998). Large five to ten pound Dolly Varden could be caught in the Pend Oreille River at Charr Springs and around Indian Creek (Cole, R. pers. comm. 1998). Large Dolly Varden were caught off of log booms at Newport, Dalkena and Usk prior to Box Canyon and Albeni Falls dam construction (Pool, D. pers. comm. 2001).

Bull trout have been documented in other areas within the recovery unit outside the Pend Oreille Core Area (*e.g.*, Spokane River, Onion Creek, Big Sheep Creek, Deadman Creek, Boulder Creek, and in Lake Roosevelt) (Vale, C. *pers. comm.* 2001; LeCaire *in litt.* 2000; Scholz *in litt.* 2000). The Northeast

Washington Recovery Unit Team recommends that additional survey work be conducted in order to evaluate how these areas would contribute to recovery.

Recent sightings in the Pend Oreille Core Area include:

LeClerc Creek

In 1993, two juvenile bull trout were documented by Plum Creek Timber company (Toth, S. *in litt*.1993). In 1995, a juvenile bull trout was observed in the same reach where juvenile bull trout were documented in 1993. Cold ground water enters LeClerc Creek at both of the sites where the bull trout were captured in 1993, and it is believed that these bull trout are utilizing available micro-habitats. In August of 1998, a 15 centimeter (6 inch) juvenile bull trout was observed during a snorkeling survey at the confluence of Fourth of July Creek and the East Branch LeClerc Creek. Most recently, in the fall of 2001 a single 51 to 61 centimeter (20 to 24 inch) bull trout was observed on a redd in the West Branch of Le Clerc Creek (Shuhda, T. *pers. comm.* 2002a).

Mill Creek

In 1995, the Kalispel Tribe observed a single bull trout (Maroney, J. pers. comm. 2001).

Cedar Creek

In 1995, a 46 centimeter (18 inch) adult bull trout was observed above the municipal dam during surveys being conducted by the Kalispel Tribe (Maroney, J. pers. comm. 2001).

Indian Creek

In September of 1999, a 61 centimeter (24 inch) gravid adult female bull trout was captured in a trap on Indian Creek (Shuhda, T. pers. comm. 2001). This fish was migrating downstream and was previously marked with an adipose fin

clip and it is thought that this fish originated above Albeni Falls Dam in Trestle Creek (a tributary to Lake Pend Oreille tributary). In 1997, the Kalispel Tribe observed a single bull trout approximately 0.8 kilometers (0.5 miles) up from the mouth (Maroney, J. pers. comm. 2001).

Sullivan Creek

In September 1994, a dead adult female bull trout was found in Sullivan Creek below Mill Pond Dam during snorkel surveys (FERC 1998).

Sweet Creek

In 2000, a 30 centimeter (12 inch) bull trout was observed during a snorkeling survey. The fish was approximately 1 kilometer (0.62 miles) up from the mouth at the barrier falls (McLellan and O'Connor 2001). In 1980, the Washington Department of Fish and Wildlife reported catching a 51 centimeter (20 inch) bull trout while gill netting at the mouth of Sweet Creek, and reported observing the carcass of a 86 centimeter (34 inch) bull trout near the mouth of Sweet Creek (McLellan and O'Connor 2001).

Marshall Creek

In June of 2000, the same female bull trout that was captured in Indian Creek (as identified by the floy tag) was recaptured near the mouth of Marshall Creek (Maroney, J. pers. comm. 2000). Marshall Creek is spring fed and although it does not have suitable spawning habitat, the cooler water temperatures may provide refugia from warmer waters in Box Canyon Reservoir.

Slate Creek

Four bull trout were captured near the outlet of Slate Creek (two in July 1994 and two in August 1995) during hook-and-line surveys conducted by Washington Department of Fish and Wildlife and the U.S. Forest Service (Shuhda, T. *pers. comm.* 2001). In September of 1997, a 22 centimeter (9 inch)

bull trout was captured (marked with an adipose fin clip) in a live trap in the mouth of Slate Creek. On August, 25, 1999, a 51 centimeter (20 inch) adult bull trout was captured during hook-and-line sampling near the mouth (Shuhda, T. *pers. comm.* 2001). Slate Creek provides cold water well within the preferred range of bull trout with summer times high water temperatures of 10 degrees Celsius (50 degrees Fahrenheit) (USDA *in litt*. 1998).

Box Canyon Reservoir

In 1989, a singe bull trout was captured while electrofishing in the reservoir (Bennett and Liter 1991). During a three year Box Canyon Reservoir study (1989-91), four bull trout were captured during electrofishing (Ashe and Scholz 1992). These fish were reported to have been captured just downstream of Indian Creek at a location known as Char Springs.

Boundary Reservoir

It was reported that two anglers had each caught a bull trout, both weighing approximately 3.6 kilogram (8 pounds). However, when the anglers were questioned with respect to being able to identify lake trout, both indicated that they would not be able to distinguish a lake trout from a bull trout and were unaware that lake trout were present in the river (McLellan and O'Connor 2001).

South Fork Salmo

Bull trout have been found in the South Fork of the Salmo River within the Salmo-Priest Wilderness Area (WDFW 1998). In June 1976, four bull trout were caught in the South Fork of the Salmo near the confluence with Watch Creek (USDA, *in litt*. 1976). In addition, two larger bull trout, over 51 centimeters (20 inches) were caught in the same area in August of 1995. During 1999 and 2000, a radiotelemetry study was conducted on bull trout in the Salmo River in Canada (Baxter and Nellestijn. 2000). Ten adult bull trout were tagged in 1999, and subsequently two of these fish were captured in the U.S. portion of the South Fork of the Salmo near the Watch Creek confluence.

Twenty adult bull trout were tagged in 2000, and three fish migrated (two repeat captures) to a similar location in the South Fork. In both years, the migrations into the U.S. occurred during the expected spawning season, and these fish migrated back the mainstem Salmo River by the end of October (Baxter and Nellestijn. 2000). Radiotagged individuals from the Salmo River migrated into the South Fork in late summer to spawn and returned to main river in late fall (Baxter and Nellestijn. 2000).

Uncertainty surrounding the life history patterns of remaining bull trout in the South Fork Salmo River and the use, and reliance on habitat in British Columbia, precluded the delineation of a core area. The Northeast Washington Recovery Unit Team believes that further survey work is needed in order to determine distribution of bull trout in this system. Continued cooperation with the British Columbia Ministry of Fisheries will be needed in order to gain a better understanding of the current status and distribution of bull trout in the South Fork Salmo River.

REASONS FOR DECLINE

Dams

In 2000, the U.S. Fish and Wildlife Service issued a Biological Opinion on the Effects to Listed Species from Operations of the Federal Columbia River Power System (USFWS 2000). In general, effects of the Federal Columbia River Power System included: (1) fish passage barriers and entrainment, (2) inundation of fish spawning and rearing habitat, (3) modification of the streamflow and water temperature regime, (4) dewatering of shallow water zones during power operations, (5) reduced productivity in reservoirs, (6) gas supersaturation of waters downstream of dams, (7) loss of native riparian habitats, (8) water level fluctuations interfering with establishment of riparian vegetation along reaches affected by power peaking operations, and (9) establishment of non-native riparian vegetation along affected reaches.

Dams can affect bull trout by altering habitats; flow, sediment, and temperature regimes; migration corridors; and interspecific interactions, especially between bull trout and introduced species (WDW 1992; Craig and Wissmar 1993; Rieman and McIntyre 1993). In addition, hydroelectric facilities can directly impact bull trout via entrainment, and by direct injury or mortality by passing through turbines. Impassable dams have caused declines of bull trout primarily by preventing access of migratory fish to spawning and rearing areas in headwaters and precluding recolonization of areas where bull trout have been extirpated (Rieman and McIntyre 1993; MBTSG 1998).

For purposes of bull trout recovery planning, metapopulation theory is an important consideration in evaluating connectivity between local populations. A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994). Multiple local populations distributed and interconnected throughout a watershed provide a mechanism for spreading risk from stochastic events (See Chapter 1). As defined, bull trout core areas reflect metapopulation theory, and a recovered condition for the Pend Oreille Core Area needs to include the reconnection of local populations. In addition, establishing interconnected local populations

within the Pend Oreille Core Area would assist in meeting effective population size criteria, and minimizing the deleterious effects of genetic variation due to drift (See Chapter 1).

The construction and operation of Albeni Falls, Box Canyon, and Boundary Dams on the Pend Oreille River have fragmented habitat in the system, and have negatively impacted migratory bull trout in Washington (NPPC 2001;WDFW 1992). Bull trout were once abundant in the Pend Oreille River and it's tributaries (Gilbert and Everman 1895; Smith, A. *in litt*. 1936-38). While entrainment at hydroelectric facilities has been identified as a potential threat to bull trout (USFWS 2000), specific studies designed to evaluate impacts at Albeni Falls, Box Canyon, and Boundary Dams have not been conducted. In 1999, a single tagged bull trout, which originated from Lake Pend Oreille was captured downstream of Albeni Falls Dam in Indian Creek (Maroney, J. pers. comm. 2000). The Northeast Washington Recovery Unit Team recommends that studies be conducted to quantify the entrainment impact at each facility, and corrective measures where appropriate be implemented. Other dams and diversions without fish passage facilities (*e.g.* Cedar Creek, Sullivan Creek, and Mill Pond Dams) were constructed in tributaries to the Pend Oreille River and have further fragmented native populations and reduced connectivity (NPPC 2001).

In addition to eliminating connectivity, dams within the system have significantly altered habitat characteristics in the Pend Oreille River (NPPC 2001). Operation of each facility continues to have a significant impact on bull trout habitat. Mainstem dams have changed the habitat from that of a cold water fast-moving river, to a warm and shallow reservoir (NPPC 2001). Surface water releases from Albeni Falls Dam exceed 20 degrees Celsius (68 degrees Fahrenheit) from early July through late September and is on the Washington State 303(d) list for temperature (NPPC 2001). Typical spawning, rearing, and overwintering habitat in a free flowing river with pools, glides, riffles and side habitat have been eliminated. Water temperatures have risen during the summer months and macrophytes and warm water fish species (including predators of bull trout) have proliferated in this changed environment (NPPC 2001). In addition,

total dissolved gas is a potential problem below each mainstem facility with levels reaching 139 percent saturation (NPPC 2001).

Albeni Falls Dam

Albeni Falls Dam was completed in 1955 (USACOE 1989), and effectively eliminated passage between Lake Pend Oreille and the Pend Oreille River. Fishing for large Dolly Varden (bull trout) was always good at the base of Albeni Falls during their spawning season prior to the dam construction (Pool, D. pers. comm. 2001). The falls at the dam site, prior to construction, were not considered a barrier to upstream fish passage (Gilbert and Everman 1895). This artificial blockage genetically isolated the lower river population from the Lake Pend Oreille population with the exception of any entrained fish entering the lower system.

Box Canyon Dam

Box Canyon Dam became operational in 1956 (USACOE 1989), and greatly changed the existing riverine habitat of riffles, pools, gravel bars and side channel habitat into a more uniform habitat of a reservoir (NPPC 2001). Box Canyon Reservoir now contains low velocity habitat (Falter *et al*. 1991), which is unsuitable for native salmonids. Non-native warmwater fish such as yellow perch, tench, and largemouth bass dominate the fish community of Box Canyon Reservoir.

Box Canyon was not considered a fish passage barrier prior to the construction of Box Canyon Dam at River Kilometer 55 (River Mile 34). Bull trout were able to move freely up-stream and downstream for at least 12 kilometers (7.5 miles) below Box Canyon Dam to the vicinity of Metaline Falls at River Kilometer 43 (River Mile 27) including access to Sullivan Creek. Metaline Falls was considered by biologists to be a significant obstacle for migratory fish, but not entirely impassable (Gilbert and Evermann 1895). With the construction of Boundary Dam and reservoir at River Kilometer 27 (River Mile 17.0) in 1967, there are no longer any significant passage barriers for native salmonids in the

Pend Oreille River between the Box Canyon and Boundary Dams. Therefore, if fish passage were provided at Box Canyon Dam, the Pend Oreille River would provide a 73 mile long corridor accessible to bull trout (and other native salmonids) from Albeni Falls Dam downstream to Boundary Dam.

Boundary Dam

Boundary Dam was completed in 1967 (USACOE 1989), and blocked intermittent upstream access to bull trout in Canada from the lower 27 kilometers (17 miles) of river in Washington. Bull trout in this portion of the river, and in the Salmo River, a major tributary of the lower Pend Oreille River in Canada, were effectively disconnected from spawning, rearing, foraging, and overwintering habitat above the dam. Any remaining bull trout in the new reservoir (Boundary) are now limited to 2.4 kilometers (1.5 miles) of spawning and rearing habitat.

Tributary Dams

Sullivan Lake and Mill Pond Dams were constructed between 1910 and 1913. There is no evidence that any natural blockages to fish passage existed at either dam site prior to dam construction. At the time, fish passage over these dams was provided in the form of fish ladders. It is unclear what specie(s) migrated to and from Sullivan Creek and Sullivan Lake and its tributaries to the Pend Oreille River. However, it is clear that bull trout, which have been documented in Sullivan Creek below Mill Pond as early as the 1930's (West, K. pers. comm. 1997) and as late as 1994, have been separated from additional spawning and rearing habitat in upper Sullivan Creek and Sullivan Lake tributaries since at least 1921. There was approximately 84 kilometers (52 miles) of suitable habitat lost to bull trout when fish passage was eliminated at these two dams (Shuhda *pers. comm.* 2002b) Cedar Creek dam was constructed in 1910 to provide a municipal water supply for the town of Ione. The 6 meter (19 foot) dam was reconstructed in 1950, and blocks approximately 15 kilometers (9 miles) of high quality bull trout habitat (Shuhda *pers. comm.* 2002b).

Forest Management Practices

Both direct and indirect impacts from timber harvest have altered habitat conditions in portions of the Northeast Washington Recovery Unit. Impacts from timber harvest management can include the removal of large woody debris, reduction in riparian areas, increases in water temperatures, increased erosion, and simplification of stream channels (Quigley and Arbelbide 1997). Past timber harvest practices include the use of heavy equipment in the channels, skidding logs across hillslopes, splash damming to transport logs downstream to mills, and road construction. Today the legacy of these activities still persists where the road conditions, channel changes, and compaction of hill slopes remain.

The aquatic assessment portion of the Interior Columbia Basin Ecosystem Management Project provided a detailed analysis of the relationship between road densities and bull trout status and distribution (Quigley and Arbelbide 1997). The assessment found that bull trout are less likely to use streams for spawning and rearing in highly roaded areas, and were typically absent at mean road densities above 1.1 kilometer per square kilometer (1.7 miles per square mile). Road construction and maintenance can lead to effects to bull trout habitat when sedimentation, channel connectivity, high erosion and slope hazards, culvert sizes, and access are not addressed concurrently with land management proposals. Roads can promote simplification and channelization, which reduces the connectivity of surface and ground waters. Road densities within Sullivan, Le Clerc, Mill, Indian, Tacoma, Ruby,Slate and Calispell creeks ranges from 1.4 to 2.4 kilometers per square kilometer (1.54 and 3.86 mile per square mile) (USFS *in litt.* 2002). The Northeast Washington Recovery Unit Team recommends that road densities within these watersheds be reduced in order to facilitate bull trout recovery.

Past and present forest management practices have adversely affected riparian and stream habitat (NPPC 2001). Past practices such as the unlimited clearcutting and thinning of riparian vegetation, the construction of splash dams utilizing the stream to transport logs, the construction of log flumes and diversion of streamflow from the creek, the destruction of riparian vegetation through the building of timber railroads and forest roads, the use of smaller side drainages as

skid trails and harvest-related wildfire have decreased the function of the existing riparian vegetation in many areas. Specific areas of concern within the Pend Oreille Core Area include portions Sullivan, Mill, Cedar, Ruby, Tacoma, Calispell, and Le Clerc creeks (USFS 1996a; USFS 1997; USFS 1998a; USFS 1999a; USFS 1999b; USFS 1999c; USFS 1999d; USFS 1999e).

Livestock Grazing

Improperly managed livestock grazing degrades bull trout habitat by removing riparian vegetation, destabilizing streambanks, widening stream channels, promoting incised channels and lowering water tables, reducing pool frequency, increasing soil erosion, and altering water quality (Howell and Buchanan 1992; Mullan *et al.* 1992; Overton *et al.* 1993). These effects can reduce overhead cover, increase summer water temperatures, and increase sediment in spawning and rearing habitats.

Livestock grazing has impacted both upland and riparian areas of most tributaries in the watershed on public and private land. There is an extensive grazing program operated by the USFS in many of the tributaries to the Pend Oreille River. The results of poor livestock management is the overgrazing of the riparian vegetation. This overutilization leads to the decline in vigor and/or disappearance of species that cover and stabilize streambanks with their root systems. The compacting and cutting action of the hooves of livestock on moist soils causes the sloughing of banks where localized use for feeding, watering and crossing occurs. The indirect effect is to increase bank erosion and embeddedness of the streambed substrate, widening of the stream channel and an increase in water temperature due to lack of overhanging vegetation. Livestock may also cause direct mortality of eggs or alevin if the redd (spawning bed) is trampled during watering or crossing. Specific areas of concern where grazing has impacted stream habitat include: LeClerc Creek (Middle and East branches), Ruby Creek, and Calispell Creek (USFS 1997; USFS1998b; USFS1999f; USFS 1999g).

Agricultural Practices

Agriculture is limited in the Pend Oreille watershed as a function of a limited base of land on which to farm. However, most available farm land has been or is being used. Agriculture has contributed impacts through stream channelization, sediment input and water quality problems (NPPC 2001).

Mining

Mining is limited in the Pend Oreille Core Area. Dredging and sluicing occurs primarily in Sullivan Creek during July and August and may have an effect on bull trout fry and juveniles if present in the system (USFS 1996b). This type of activity could push fry and juveniles out of side habitat into less desirable habitat and disrupt the habitat for the macroinvertebrate community. The Northeast Washington Recovery Unit Team recommends that all mining activities strictly follow State practices (WDFW 1999).

Residential Development and Urbanization

The mainstem Pend Oreille River has grown in popularity as a preferred area for home sites. As the population increases more impacts to riparian areas and water quality are likely (NPPC 2001). Future impacts may include increases in nutrient loading from septic systems, chemical applications, and additional road construction.

Fisheries Management

Non-Native Species

Native and non-native populations of salmonids and other species have been introduced in the Pend Oreille River and its tributaries since before the turn of the century (NPPC 2001). The introduction of the brook trout into northeastern Washington streams and rivers occurred at least as early as the 1920's and continued into the 1980's by the Washington Fish Commission, Washington

Department of Game and the Washington Department of Fish and Wildlife. Brook trout (*Salvelinus fontinalis),* which are abundant in a majority of the tributaries of the Pend Oreille River, have impacted bull trout populations through competition and hybridization (NPPC 2001).

Brown trout (*Salmo trutta)* were introduced to the Pend Oreille River via plantings in the 1890's (Ashe and Scholz 1992; NPPC 2001). Brown trout are effective predators and can reduce a bull trout population through mortality. Presently, both species are stocked only in lakes without outlets into stream systems. Both brook and brown trout can compete with bull trout for food and habitat at the adult, juvenile, and spawning life stages.

Other predatory fish species, such as northern pike *(Esox lucius*) have migrated downstream from the Clark Fork River, Montana. Walleye *(Stizostedion vitreu*m) were planted by Washington Department of Game in 1983 and 1984 (500,000 and 253,000, respectively) (Bennett and Liter 1991). The Washington Department of Game also planted 148 tagged adult walleye in 1987 (Ashe and Scholz 1992). Smallmouth bass (*Micropterus dolomieu*) were introduced into the Pend Oreille and upper Columbia river basins as early as the 1930's. (Pool, D. pers. comm. 2001). Largemouth bass (*Micropterus salmoides*) were widely introduced in Oregon and Washington in 1890 to 1895 by the U.S. Bureau of Fisheries, and have extended their range northward into British Columbia, probably via river systems (Wydoski and Whitney 1979). Largemouth bass have been in the Pend Oreille River at least the past 43 years, as they were present in Washington Department of Fish and Wildlife creel surveys. In 1997, the Kalispel Tribe constructed a largemouth bass hatchery to increase the harvestable number of largemouth bass in Box Canyon Reservoir (NPPC 2001). Predatory species such as largemouth bass can effect the survival rates of native salmonids including bull trout. Further research and evaluation on possible impacts of fish stocking programs would be useful (Pearsons and Hopley 1999; Ham and Pearsons 2001).

Harvest

It is unknown whether or not historic harvest of bull trout may have eliminated populations in small tributaries and contributed to the overall decline. Before 1992 bull trout angling was controlled by standard statewide seasons and limits for trout, except in the mainstem Pend Oreille River where the season was year-round (WDFW 1998). Since 1992, fishing for bull trout in the Pend Oreille system, including the South Fork of the Salmo river, has been closed. The Northeast Washington Recovery Unit Team recommends that a comprehensive fish management plan be developed for the Pend Oreille River in Washington. The plan should address possible incidental harvest of bull trout. Misidentification of bull trout by anglers may be a cause (Schmetterling and Long 1999).

Isolation and Habitat Fragmentation

Road culverts in watersheds with bull trout also pose a barrier or blockage to upstream passage (NPPC 2001). Culverts may preclude bull trout from entering a drainage during spawning migrations, out-migration of juveniles, foraging activities, and may also limit access to refuge habitat needed to escape high flows, sediment, or higher temperatures. Culverts have been identified as a potential limiting factor for salmonids in the Pend Oreille Core Area (NPPC 2001). There is a need for a specific limiting factors analysis in the Pend Oreille Core Area to identify culverts which would specifically impact bull trout recovery. Specific road culverts which have already been identified as possible passage barriers include U.S. Forest roads on Sullivan Creek (numbers 2220000, 2212200, 220000, 1935000, 1935030, and 1936000), and Saucon Creek (County Road 1935000) (USFS 2001). Impassable culverts within the Le Clerc Creek have also been identified as potential barriers (USFS 1997).

ONGOING RECOVERY UNIT CONSERVATION MEASURES

In 1995, the Kalispel Tribe in conjunction with the Washington Department of Fish and Wildlife initiated the Kalispel Resident Fish Project. This project consisted of conducting habitat and population surveys to determine existing habitat conditions and determine fish distribution and abundance. Habitat assessments were used to determine the types and quality of habitat that were limiting to native bull trout and westslope cutthroat trout. Data collected in these assessments were compiled to develop recommendations for enhancement measures. From 1996 to 1998, the Kalispel Tribe implemented those recommendations in Middle Branch LeClerc, Indian Creek, and Mill Creek. These recommendations included instream structures, exotic brook trout removal, small woody debris removal, and riparian planting and fencing. Monitoring and evaluation of these enhancement measures started in 1997 and will continue at least through 2001.

The Kalispel Tribe in cooperation with Pend Oreille County replaced a culvert on Mill Creek in 1997 with an arched bridge to improve fish passage. In addition, the Kalispel Tribe initiated an adfluvial trapping program in 1998 in conjunction with Pend Oreille County Public Utility District. The goal of this project is to determine which tributary streams may have adfluvial fish populations. To date, only one bull trout (large gravid female) has been captured in the downstream trap at Indian Creek.

The Colville National Forest in cooperation with the Kalispel Tribe, Pend Oreille County Roads Dept., Stimson Lumber Company and the Washington Department of Fish and Wildlife , have relocated 4 kilometers (2.5 miles) of road out of the riparian area of the East Branch Le Clerc Creek and are in the process of rehabilitating the existing road to a more natural condition. This includes riparian planting, culvert removal, channel reconstruction and stabilization, road obliteration and fencing. The U.S. Forest Service in cooperation with Stimson Lumber Company has also resurfaced an existing road within the riparian area of the Middle Branch Le Clerc Creek to reduce soil movement into the stream. In addition, livestock crossings have been hardened, fencing has been built to protect riparian vegetation from overgrazing and riparian planting to improve channel and riparian habitat conditions.

RELATIONSHIP TO OTHER CONSERVATION EFFORTS

State of Washington

Salmon Recovery Act

The Governor's office in Washington State has developed a statewide strategy (Washington Governor's Salmon Recovery Office 1999) that describes how state agencies and local governments will work together to address habitat, harvest, hatcheries, and hydropower as they relate to recovery of listed species. The Salmon Recovery Act, passed in 1998, provides the structure for salmonid protection and recovery at the local level (counties, cities, and watershed groups).

The Salmon Recovery Planning Act of 1998 directs the Washington State Conservation Commission, in consultation with local government and treaty tribes to invite private, federal, state, tribal, and local government personnel with appropriate expertise to convene as a Technical Advisory Group. The purpose of the Technical Advisory Group is to identify habitat limiting factors for salmonids. Limiting factors are defined as "conditions that limit the ability of habitat to fully sustain populations of salmon, including all species of the family Salmonidae." The bill further clarifies the definition by stating "These factors are primarily fish passage barriers and degraded estuarine areas, riparian corridors, stream channels, and wetlands." It is important to note that the responsibilities given to the Conservation Commission in ESHB 2496 do not constitute a full limiting factors analysis. This report is based on a combination of existing watershed studies and knowledge of the Technical Advisory Group participants. The Pend Oreille Conservation District is the lead entity for Water Resource Inventory Area 62, and will be developing a limiting factors analysis and coordinating salmonid recovery efforts. Coordination with these activities is essential for recovery of bull trout in the Pend Oreille Core Area.

Washington State Bull Trout Management Plan

The Washington Department of Fish and Wildlife has developed a bull trout management plan that addresses both bull trout and Dolly Varden (WDFW 2000). The Washington Department of Fish and Wildlife no longer stocks brook trout in streams or lakes connected to bull trout waters. Fishing regulations prohibit harvest of bull trout, except for a few areas where stocks are considered "healthy," within the State. The Washington Department of Fish and Wildlife is also currently involved in a mapping effort to update bull trout distribution data within the State of Washington, including all known occurrences, spawning and rearing areas, and potential habitats. The salmon and steelhead inventory and assessment program is currently updating their database to include the entire state, which consists of an inventory of stream reaches and associated habitat parameters important for the recovery of salmonid species and bull trout.

Forest Practices

In January 2000, the Washington Forest Practices Board (WFPB 2000) adopted new emergency forest practice rules based on the Forest and Fish Report. These rules address riparian areas, roads, steep slopes, and other elements of forest practices on non-federal lands. Some provisions of forest practice rules represent improvements over previous regulations, for other provisions the plan relies on an adaptive management program for assurance that the new rules will meet the conservation needs of bull trout. Research and monitoring being conducted to address areas of uncertainty for bull trout include protocols for detection of bull trout, habitat suitability, forestry effects on groundwater, field methods or models to identify areas influenced by groundwater, and forest practices influencing cold water temperatures. The Forest and Fish Report development process relied on broad stakeholder involvement and included state agencies, counties, tribes, forest industry and environmental groups. A similar process is also being used for agricultural communities in Washington and is known as Ag, Fish, and Wildlife. The U.S. Fish and Wildlife Service is considering the possible impacts and potential benefits from both of these State processes relative to bull trout recovery.

Subbasin Planning

As part of the Pacific Northwest Electric Power Planning and Conservation Act of 1980, the Bonneville Power Administration has the responsibility to protect, mitigate and enhance fish and wildlife resources affected by operation of Federal hydroelectric projects in the Columbia River and tributaries. The Northwest Power Planning Council develops and implements the Columbia River Basin Fish and Wildlife Program which is implemented by the BPA, COE, BOR, and FERC. Coordination of BPA's responsibilities for protection, enhancement, and mitigation and incorporation of recommendations by NPPC is in part done through the development of subbasin summaries which identify status of fish and wildlife resources, limiting factors, and recommended actions at the subbasin level.

The draft Pend Oreille subbasin summary (NPPC 2001), overlaps in part with the Northeast Washington Recovery Unit, and is consistent with bull trout recovery planning efforts to identify limiting factors. The draft Pend Oreille subbasin summary identifies degraded habitat, loss of connectivity, and non-native species introductions as contributing to the decline of bull trout. The overall fisheries goal of the draft Pend Oreille subbasin plan is "...to mitigate and compensate for resident and anadromous fish loses caused by the construction and operation of Federally operated and Federally regulated hydropower projects.". According to the subbasin plan this goal will be achieved by "...restoring sustainable, naturally producing populations of native fish to support tribal and non-tribal harvest...". The Northeast Washington Recovery Unit Team will continue to coordinate with these planning efforts through the development of subbasin plans.

Biological Opinion on the Federal Columbia River Power System

On December 20, 2000, the U.S. Fish and Wildlife Service issued a Biological Opinion on the "Effects to Listed Species from Operation of the Federal Columbia River Power System" (USFWS 2000). The opinion identifies Albeni Falls Dam as a major barrier for migratory bull trout and attributes the

decline of bull trout in the Pend Oreille River to the construction and operation of this facility. The opinion states that "In the absence of passage, migratory bull trout remaining the Pend Oreille River will continue to be harmed.". This conclusion is consistent with the Northeast Washington Recovery Unit Team's evaluation of the ongoing threats associated with Albeni Falls Dam. Recommended actions identified within the Biological Opinion highlight the need for research to investigate problems associated with passage, entrainment, spill, flow attraction, and water quality. As reflected in the Recovery Criteria (*i.e.*, barrier removal), passage at Albeni Falls, Box Canyon, and Boundary Dams is important for bull trout recovery. Reconnecting Lake Pend Oreille to the mainstem Pend Oreille River in Washington is of special importance and fish passage at this facility should be expedited.